

## Popponesset Bay Subwatershed

### Mashpee, Sandwich, and Barnstable, Cape Cod, Massachusetts

The Popponesset Bay Subwatershed is located in Mashpee, Sandwich, and Barnstable. It has an area of 11,277 acres. The harbor system is comprised of four subsystems: Popponesset Bay proper, Ockway Bay, Shoestring Bay, and Mashpee River.

This watershed is facing problems with nitrogen loading in its rivers and bays. There is a serious problem of over-nutrication in the Mashpee River Estuary, an arm of Popponesset Bay. Effluent from septic systems, road runoff, fertilizers, and other sources are polluting the river, as well as Popponesset, Ockway, and Shoestring Bays. The former Cape Cod Watershed Team requested in 2000 that Popponesset Bay be added to the Massachusetts 303(d) List.

A Division of Marine Fisheries Sanitary Survey of Popponesset Bay in 1995 identified 20 locations in Barnstable and 48 locations in Mashpee where there is evidence of stormwater discharge or road runoff into the bay.

Mashpee has no municipal sewers, but there are five private sewage treatment plants in the subwatershed. These plants service Mashpee Commons, Southcape Village, Windchime Point, Willowbend, and Stratford Ponds Condominiums. The plants might be used or expanded to treat nitrogen rich water that enters Mashpee's rivers and the bays. The potential for relocation of effluent is limited to a small area in New Seabury on the south coast of Mashpee. According to New Seabury's Environmental Impact Report, the potential discharge of 500,000 gallons per day of municipal treated effluent will have no adverse impacts. The Town of Mashpee received a loan from the State Revolving Fund in 2001 to fund a watershed nitrogen management plan and the preliminary design of a pipeline to take effluent out of Popponesset Bay and to New Seabury. The Mashpee Board of Selectman formed a Community Advisory Committee to provide reaction to the watershed nitrogen management plan.

Mashpee has a municipal water system that is growing rapidly, adding 400 to 500 new service connections each year. Most of the new growth in town is in existing neighborhoods. With the addition of the town's fifth well in May of 2002, the district's daily capacity is 3.8 million gallons. Average daily demand among the 7,343 customers is 1.26 million gallons, though peak day demand in July 2001 was 2.7 million gallons. According to the Mashpee Water District's 2001 annual report, the district still needs at least one more well, and work is currently underway to determine a site.

The northern portion of the Popponesset Bay watershed falls within the Massachusetts Military Reservation. Past oil, fuel, chemical, and hazardous waste disposal activities on the base have created groundwater pollution plumes, some of which are located within this watershed. The Air Force Center For Environmental Excellence (AFCEE) is investigating and addressing this groundwater pollution. The Augat Plume was discovered in 1996. Studies have indicated that the volatile organic compounds (VOCs) from the plume come up under Shoestring Bay. Another plume emanates from the J. Braden Thompson site, an abandoned junkyard in Forestdale. The plume containing the solvents tetrachloroethylene and trichloroethylene stretches more than 5,500 feet from the junkyard to the Mashpee-Wakeby Pond. The state removed contaminated soil from the site and is building a water treatment plant for the plume.

This watershed hosts a portion of the Mashpee National Wildlife Refuge (MNWR). The MNWR was created in 1995 as a federal, state, and local partnership. A Management Committee comprised of the various partners is in the process of developing a management coordination plan for the area. There is a Memorandum of Understanding between parties who own land within its boundary, along with the Mashpee Wampanoag Indian Tribal Council, to manage their lands in a coordinated manner. The refuge covers an area of 5,800 acres. Protected lands in the MNWR have been acquired through purchases, donations, Self-Help and Land Bank monies, and being taken for taxes. A great

variety of fish and wildlife habitats comprise the refuge, including salt water bays, tidal marshes, Atlantic White Cedar swamps, vernal pools, wooded lowlands and uplands, mixed canopy forests, freshwater marshes and streams, kettle hole ponds, and pitch pine barrens. There are 1,649 acres within the refuge that are still in private ownership. A federal staff person at the Monomoy National Wildlife Refuge in Chatham devotes part of her time to the management of the MNWR.

### Stewards:

- Cotuit Waders
- Cotuit-Santuit Civic Association
- Mashpee National Wildlife Refuge Management Committee
- Mashpee Sewer Commission
- KUSP (Keep Untamed Santuit Pond)
- Mashpee Environmental Coalition

### Studies conducted in the subwatershed:

- Coastal Sediment Transport, Popponesset Beach, MA. Aubrey and Goud. WHOI 83-26. August 1983.
- A Cumulative Impact Assessment Plan to Reduce and Control Sources of Contamination in the Mashpee and Santuit/Shoestring Bay River Estuaries. K-V Associates. June 1991.
- Assessment of Coastal Nitrogen Loading and Nitrogen Management Alternatives: Popponesset Bay, Draft. December 1995. Cape Cod Commission.
- Nutrient Related Water Quality within the Popponesset Bay System, Part I: Summer Survey of Nutrient and Oxygen Levels. Prepared by Town of Mashpee and Center for Marine Science and Technology, December 10, 1997.
- Watershed Nitrogen Management Plan and Effluent Pipeline Preliminary Design. Town of Mashpee, Massachusetts. Environmental Notification Form. September 27, 2001. (A comprehensive nitrogen and wastewater management planning project for the Town of Mashpee, the Popponesset Bay Watershed, and Mashpee's portions of the Waquoit Bay Watersheds). Prepared by Stearns & Wheler. Funded with State Revolving Funds.
- Cape Cod Coastal Embayment Project – A Nitrogen Loading Analysis of Popponesset Bay. 1998. Cape Cod Commission.
- Center for Marine Science and Technology study on nitrogen reduction to restore the Mashpee River system. Approximately 1999, 2000.
- VOC Sampling of Augat Plume. 1999. Cotuit Waders.
- Sanitary Survey of Popponesset Bay Shoreline. March 1995. Division of Marine Fisheries.
- Mashpee Property Tracts 37 and 41 were evaluated for their suitability for future water supply sites in the Phase II Priority Land Acquisition Assessment Project conducted by the Cape Cod Commission. March 2001.
- Cape Cod Atlas of Tidally Restricted Salt Marshes. 2001. Cape Cod Commission.
- Popponesset Bay was selected as a priority area for the Estuaries Project – Southeastern Massachusetts Embayment Restoration, funded by the state and UMass Dartmouth. The goal of the project is to develop critical nutrient loading thresholds for each embayment to aid in water resources planning and which will support federal requirements for the development of Total Maximum Daily Loads for impaired surface waters. This area will be evaluated in 2002.
- Coastal Nitrogen Loading Project: Final Report. April 2002. Cape Cod Commission Water Resources Office. (1 of the 4 sites assessed was Popponesset Bay).

### Who is collecting water quality data and where:

- The Cotuit Waders conduct monthly sampling at five sites in the Santuit River, three in Shoestring Bay, one in Popponesset Bay, and one in Santuit Pond. The sampling is used to evaluate fecal coliform problems and algae blooms. Parameters studied include fecal coliform and fecal strep bacteria, temperature, salinity, clarity, dissolved oxygen, total suspended solids, chlorophyll a, PON, POC, orthophosphate, nitrate nitrogen, ammonium-nitrogen, and nitrite-nitrogen.
- Mashpee residents sample the Mashpee River, Popponesset Creek, Popponesset Bay, and Nantucket Sound in an effort coordinated with the Cotuit Waders and SMAST.
- The Mashpee Shellfish Constable samples Popponesset Bay for bacteria.
- The United States Geological Survey maintains stream flow gauges in the Mashpee and Santuit Rivers, collecting data that will be used in the Massachusetts Estuaries Project.

### Management actions taken:

- Massachusetts Division of Fish and Wildlife stocks Mashpee-Wakeby and Pimlico Ponds with rainbow, brook, and brown trout.
- The Town of Sandwich limited boat engines to 10 horsepower on Pimlico Pond.
- Willowbend developers are planning to add nine new links to the golf club's existing 18 holes. The project calls for constructing the new holes on three parcels of environmentally fragile land around Shoestring Bay, totaling 67.9 acres. The project was reviewed by the Cape Cod Commission and approved in early 2002.
- The Town of Barnstable is applying for a State Revolving Fund (SRF) loan for a Nutrient Management Planning Project. This is a comprehensive project to manage wastewater, stormwater, and fertilizer loadings that are causing nutrient and other water quality related problems to the town's coastal and freshwater bodies. Project area includes the entire Town of Barnstable, Shoestring Bay recharge area of the Popponesset Bay Subwatershed, Three Bay Subwatershed, Centerville River/East Bay Watershed, and Barnstable Harbor Subwatershed.
- Developers proposed a 278-acre private development on the border of Barnstable and Mashpee along the Santuit River for the Cape Club Golf Club. Concerns were raised that a golf course would drain water resources and will add nitrogen to the already overloaded watershed system. The project required the development of an Environmental Impact Review and Cape Cod Commission approval. In March 2002, an agreement was reached for the Towns of Barnstable and Mashpee and the Commonwealth to buy the land to preserve as open space.

### Subwatershed facts: (See Appendix for data sources)

- 21 E sites: 2 – located at J. Braden Thompson, J. Braden Thompson Rd. and on Main Street
- Solid waste sites: 1
- Zone IIs located in this watershed: More than 2
- Interim Wellhead Protection Areas (IWPAs): 6
- Percent of the undeveloped land that is protected (according to 1985/1990 data): 24.1%
- Acres of existing wetlands: 320
- Certified vernal pools: 10
- Named freshwater ponds: Washburn, Mashpee/Wakeby, Coomb's, Amos, Santuit (*Mashpee*), Pimlico, Lily (*Sandwich*), Naomi (*Barnstable*)
- Named rivers or creeks: Mashpee River, Santuit River, Quaker Run, Popponesset Creek

- Shellfish growing areas: Popponesset and Ockway Bays are approved for shellfishing. Mashpee River and Shoestring Bay are prohibited.
- Beach closures: The beach at Little River was closed to swimming for at least one day during the 2001 season due to high enterococcus bacteria counts.
- 1998 Massachusetts 303(d) List of Impaired Waters: A segment of the Mashpee River, from Quinaquisset Avenue to the mouth at Popponesset Bay – pathogens. Shoestring Bay from Quinaquisset Avenue to Ryefield Point – pathogens. Santuit Pond – nutrients and noxious aquatic plants.
- This watershed contains Natural Heritage and Endangered Species Program (NHESP) Estimated Habitats of Rare Wildlife.

#### Priorities:

- Develop critical nutrient loading thresholds for Popponesset Bay to aid in water resources planning and the development of TMDLs.
- Assess Mashpee River for nutrients, noxious weeds, and sedimentation.
- Amend impaired uses of the Mashpee River on the 303(d) List and develop strategies to address those impacts.
- The Towns of Barnstable and Mashpee should refer to the DMF Sanitary Survey (March 1995) to prioritize the 68 sites identified for stormwater remediation along the Popponesset Bay shoreline.
- Evaluate impact of proposed New Seabury development on nearby Town of Mashpee public wells.
- Protect 1,200 acres of undeveloped land within the MNWR acquisition boundary according to the Management Committee's priority list of acquisitions.
- Create signage and a visitor center in the MNWR and provide a staff person to manage the refuge. (Mashpee National Wildlife Refuge Management Committee).
- Amos Pond needs volunteers to participate in the Pond and Lakes Stewardship Project (PALS), measuring water quality and other characteristics of the pond.
- Preserve open space priority acquisitions outlined in Mashpee's Conservation and Recreation Plan.
- Acquire open space for water supply development and protection. Mashpee Tracts 4, 5, 6, 8, 23, 28, 32, 37, 41, 44, and 45 were ranked as having medium or high water supply development potential in the Cape Cod Commission's *Priority Land Acquisition Assessment Project* (April 1999). These tracts are located throughout the Town of Mashpee.
- Implement those salt marsh restoration projects identified in the 2001 *Cape Cod Atlas of Tidally Restricted Salt Marshes* that have been evaluated and prioritized by the town. The site in this subwatershed is the Quinaquissett Road/School Street restriction of the Santuit River (Site MA-6/BA-9). The Barrier Beach restriction of Rushy Marsh Pond (Site BA-10) lies just outside of this subwatershed.
- Implement Rushy Marsh Pond (Cotuit) Restoration Project: Reconnection to the Sea.
- Evaluate funding sources for improving the flushing of Rushy Marsh Pond in Cotuit.
- Explore the use of wetlands restoration to manage excess nitrogen in the Mashpee River.

**Recreation:**

Camping areas: none

Pathways and trails:

[www.capecodcommission.org/pathways/trailguide.htm](http://www.capecodcommission.org/pathways/trailguide.htm)

Golf courses:

- Cotuit Highground Golf Course
- Willowbend Country Club
- Quashnet Valley Country Club

Public access points:

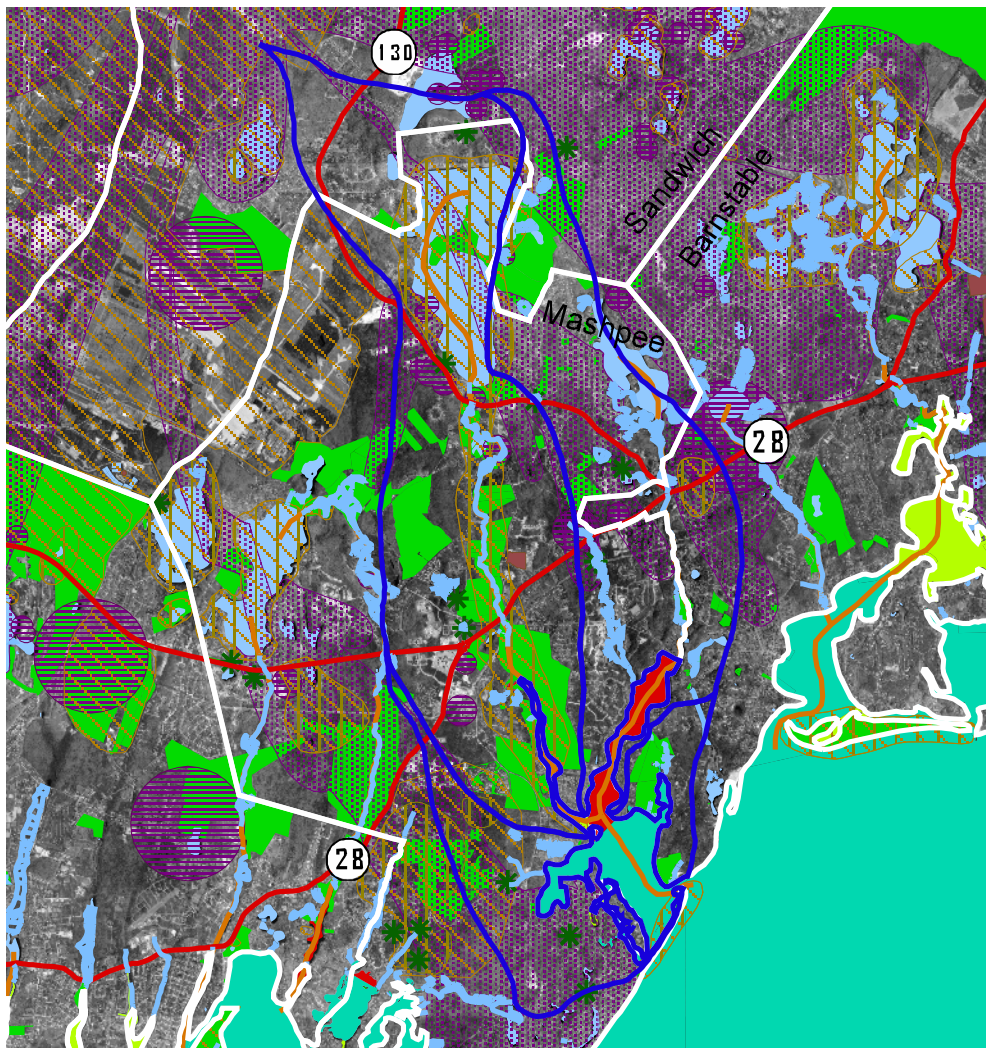
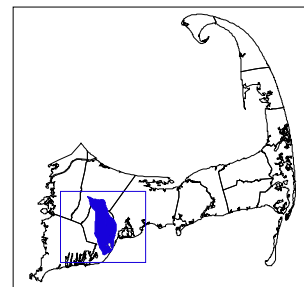
- [www.state.ma.us/dfwele/pab/pabSEmap.htm](http://www.state.ma.us/dfwele/pab/pabSEmap.htm)

Public beaches and landings:

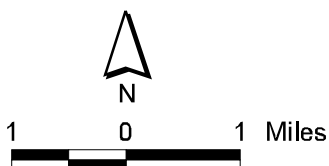
- Beach on Wakeby Pond in Ryder Conservation Area
- Mashpee town beach in Attaquin Park on Mashpee Pond
- Town Landing on Santuit Pond and state landing on Mashpee Pond
- Mitchells Landing
- Town Landings at Mashpee Neck and Ockway Bay
- Fisherman's Parking and Access at the terminus of Wading Place Road

# Popponesset Bay

Mashpee, Sandwich, and Barnstable, MA



## Watershed Resources



### Natural Heritage and Endangered Species Program Data

- Certified Vernal Pool
- Priority Habitats of Rare Species
- Estimated Habitats of Rare Species

### Groundwater Protection Areas

- Interim Wellhead Protection Area
- Zone II
- Solid Waste Facility

Watershed Boundary

Anadromous Fish Run

### Shellfish Growing Areas

- APPROVED
- CONDITIONALLY APPROVED
- MANAGEMENT CLOSURE
- PROHIBITED
- RESTRICTED
- Open Space

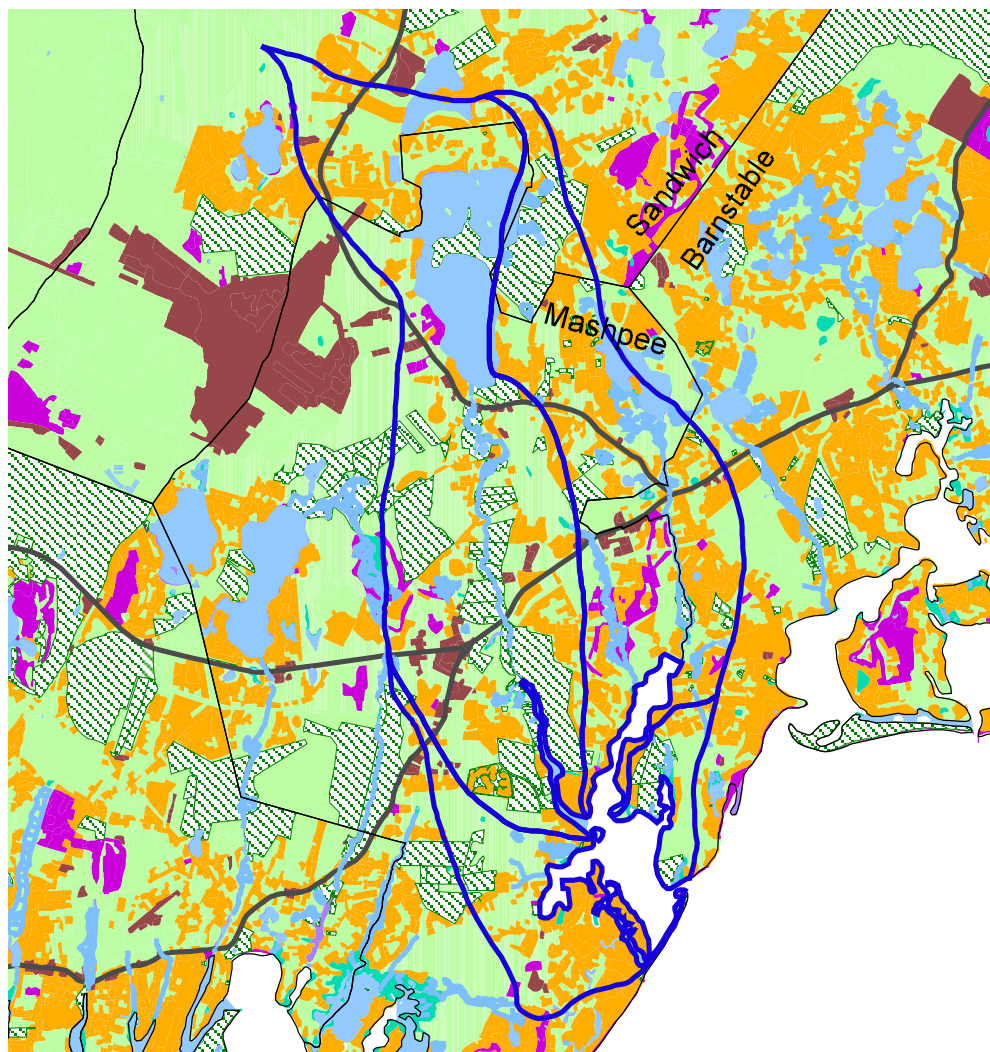
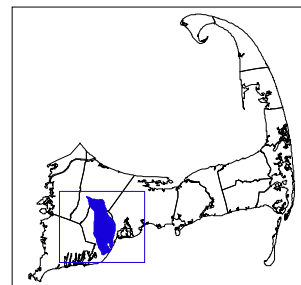
Streams

Ponds

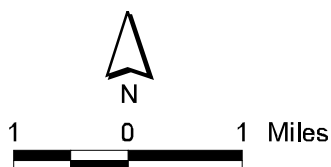
Roads

# Popponesset Bay

Mashpee, Sandwich, and Barnstable, MA



## Land Use



## Land Use

